AP CALCULUS NAME ___________________

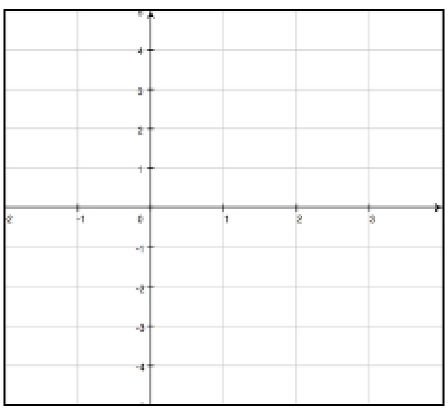
5.1 -5.3

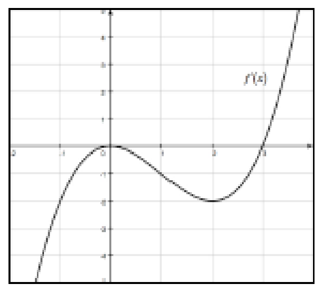
1. Find intervals of increase, decrease, and concavity. Identify locations of critical points, stationary points, inflection points, relative maximums and relative minimums for $y = x^3 - 3x + 1$. Make sign charts and include all information on your chart. Sketch the graph.

2. Find the extrema for $f(x) = 2x^3 - 3x^2 - 12x + 8$ over $[-2,2]$ and then $(-\infty,+\infty)$.

3. Find the extrema for $f(x) = \dfrac{1}{x - x^2}$ over $(0,1)$

4. To the right is a graph of $f'(x)$. Determine what a graph of $f(x)$ might look like. Create sign charts to show your logic. (*6 pts*)

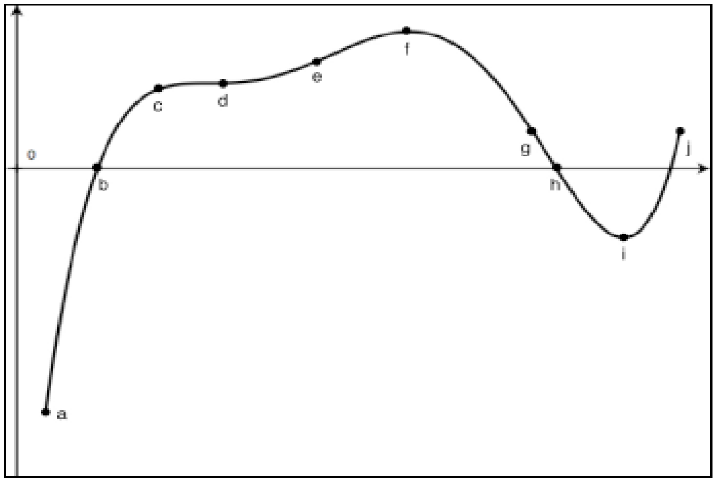




AP CALCULUS NAME ___________________

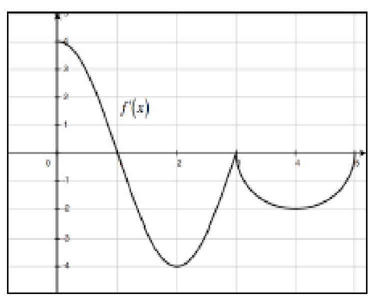
5.1 -5.3

5. To the right is a graph of $f(x)$ shown on an interval. The graph of f has horizontal tangents at d, f, and i. In the chart, place either a positive sign (+), negative sign (-) or zero (0) at the points a – j for $f(x), f'(x)$ and $f''(x)$. If there is a relative minimum, relative maximum, absolute minimum, absolute maximum or possible inflection point on the interval at these points, put an x in the appropriate column. *(13 pts)*



Pt	$f(x)$	$f'(x)$	$f''(x)$	Inflection pt.	Relative minimum	Relative maximum	Absolute Minimum	Absolute Maximum
a								
b								
c								
d								
e								
f								
g								
h								
i								
j								

6. The figure to the right shows the graph of f', the derivative of the function f, for $-0 \le x \le 5$. *(8 pts)*



a) Find all values of x, for $0 < x < 5$, at which f attains a relative maximum and relative minimum. Justify your answer.

b) Find all values of x, for $0 < x < 5$, at which f has an inflection point. Justify your answer.

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5.1 -5.3

7. For the given function $f(x)=6x^2-x^3-1$, find the x-values where $f(x)$ attains a relative minimum, relative maximum, and inflection points, if any. Justify answers.

8. For the given function $f(x)=\frac{x^2+1}{x^2-16}$, find the intervals where the function is increasing and decreasing. Justify your answer.

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9. Use the function $y = e^x \cdot x^{2/3}$ for this problem.

   a. Analyze the end behavior of the graph using limits.
   b. Find the x-intercepts
   c. Find the y-intercepts.
   d. Find the first derivative and complete the sign chart identifying intervals of increase and decrease, critical points, stationary points, and locations of relative extrema.
   e. The second derivative is $y'' = \frac{e^x(9x^2+12x-2)}{9x^{4/3}}$. Complete the sign chart identifying intervals of concavity and locations of inflection points.
   f. Sketch the graph of $y = e^x \cdot x^{2/3}$.